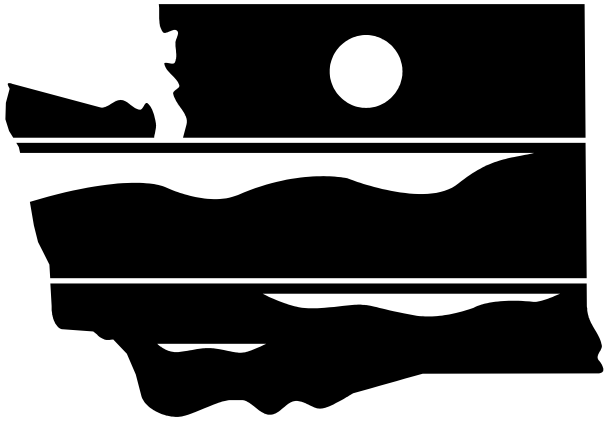

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Automated Method Data Documentation and Validation Procedure

Air Quality Program

March 2004

95-201C (rev. 3/04)

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ILLUSTRATIONS

FIGURES

1 INTRODUCTION

This document details the procedures for the documentation and validation of data collected from automated ambient air monitors within the Washington State Department of Ecology Air Quality Program network.

In accordance with the Data Quality Objectives detailed in the Air Monitoring Quality Assurance Plan section of this manual, it is the policy of the Air Quality Program to provide for the generation, storage, and use of representative and comparable air monitoring data that meet the precision, accuracy, and completeness criteria. Adherence to the procedures detailed in this document ensures the aforementioned policy is implemented and that data collected is of the highest quality.

A high quality of data is critical for many reasons. The data collected by the Air Quality Program will be utilized in making decisions that will affect human and environmental health and likely have direct economic impacts on represented areas. A high quality of data increases the likelihood that these decisions will be well-informed and that the data will withstand scrutiny, particularly in cases of litigation. Ultimately, a consistently high quality of data will enable the Air Quality Program to better serve the public's charge and Ecology's mission of cleaning and protecting the air for present and future generations.

2 MEASUREMENT QUALITY OBJECTIVES DEFINED

The "EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Part 1" states that measurement quality objectives can be defined in terms of certain data quality indicators. These indicators, or criteria, are precision, accuracy (also expressed as bias), representativeness, detectability, completeness, and comparability. These terms are defined below and, where applicable, the Air Quality Program's control limits are specified.

2.1 Precision

Precision is a measure of mutual agreement among individual measurements of the same property under prescribed similar conditions.

For automated analyzers, excluding nephelometers, individual instrument precision must be within ±10%. Individual nephelometer precision must be within ±15%. Integrated probability intervals (95% probability limits) for all automated parameters should be within ±15%. Precision is assessed through quality control checks.

Quality control checks are conducted manually by the operator or automatically via the telemetry system, data logger, and instrument.

2.2 Accuracy (also expressed as bias)

Accuracy is a measurement of the distance from the "true" value of a property under prescribed similar conditions, while bias is the systematic or persistent distortion of a measurement process which causes error in one direction.

Individual instrument accuracy of all automated parameters, excluding meteorology, must be within ±10% and the integrated probability intervals (95% probability limits) for each parameter should be within 15%. Accuracy is assessed through performance audits conducted by Quality Assurance personnel.

Meteorological accuracy is assessed through quality control checks and performance audits. The accuracy quality control limits for meteorological parameters are as follows:

Wind Speed	±5%
Wind Direction	±3%
Temperature	±.5° C
Relative Humidity	X%±5

2.3 Representativeness

Representativeness is defined as the degree to which data accurately and precisely reflects a characteristic of a population, parameter variation at a sampling point, a process condition, or an environmental condition.

2.4 Detectability

Detectability is the determination of the low range critical value of a characteristic that a method-specific procedure can reliably discern. Detectability is not specifically listed in the Air Quality Program policy statement but is nevertheless inherent in the Program's monitoring activities as monitored parameters are rarely below minimum detectable limits.

2.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected under correct, normal conditions.

The Air Quality Program requires that a minimum of 75% of each monitored hour be valid. Based on a qualitative and quantitative review, a minimum of 80% certified valid data (hourly averages) should be collected each month per parameter.

2.6 Comparability

Comparability is a measure of the confidence with which one data set can be compared to another.

Detailed calculations of precision and accuracy for individual and aggregate automated monitors and networks are presented in 40 CFR 58, Appendix A.

3 DOCUMENTATION

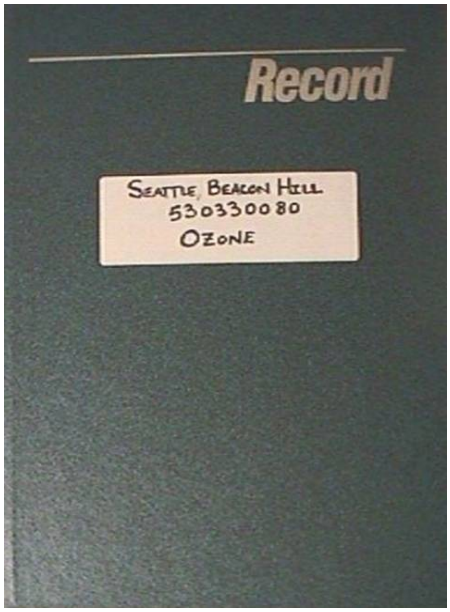
Maintaining a high level of data quality is critical in order to meet data quality and measurement objectives and fulfill the mission of the Air Quality Program. Detailed documentation is an important factor in ensuring high data quality because it allows for the thorough review of the monitoring and collection processes, facilitates troubleshooting of systematic or other sampling errors, and makes the data more defensible. This section details the procedures for proper documentation of air monitoring activities and data.

Documentation falls into two primary areas: Monitoring station log books and parameter strip charts. It should be noted that, depending upon the pollutant, there may be additional documentation requirements. For example, nephelometers have parameter-specific log sheets that need to be filled out and turned in on a monthly basis. For more information on parameter-specific documentation requirements, please refer to the appropriate standard operating procedure within this manual. The procedures for documenting log books and strip charts are detailed below.

3.1 Station Log Book

Each station must have a log book. It must remain at the station at all times and should be kept in a highly visible location so that it may be easily accessed by those not routinely familiar with the site such as substitute operators, Quality Assurance personnel, and EPA auditors. The station name, AIRS number, and parameter should be clearly labeled on the front of the log book as shown in Figure 3.1 below.

Figure 3.1: Station Log Book



The log book is the repository for detailed documentation regarding all operational and maintenance activities, quality control check results, unusual events and station conditions, performance audits, equipment changes, and other applicable information. Separate log books should be maintained for each monitored parameter in order to facilitate accurate record-keeping, troubleshooting, and performance audits.

3.2 Strip Charts

Due to advances in air monitoring technology, paper strip chart recorders are used less frequently than in the past. However, at the current time, the Air Quality Program does not utilize digital strip chart technology and therefore, the paper strip chart remains an important component of monitoring activities.

Strip charts provide a graphical representation of continuous pollutant concentrations. Graphical displays expedite the identification of instrument malfunction and facilitate data validation. In addition, they allow for the manual reduction of data in cases when digital data is unavailable. Finally, strip charts serve as the primary legal record in matters of litigation. It is for these reasons that complete, detailed, and legible strip chart documentation is critical.

All automated instruments monitoring criteria pollutants and all Prevention of Significant Deterioration (PSD) quality meteorological parameters must be used in conjunction with a strip chart recorder. Depending on the experience of the operator, the type of instrument, and the data quality and measurement objectives, automated instruments not sampling for criteria pollutants may also require strip chart recorders. The Yokogawa is the primary type of strip chart recorder utilized in the Air Quality Program monitoring network and is shown in Figure 3.2 below.

Figure 3.2: Yokogawa Strip Chart Recorder

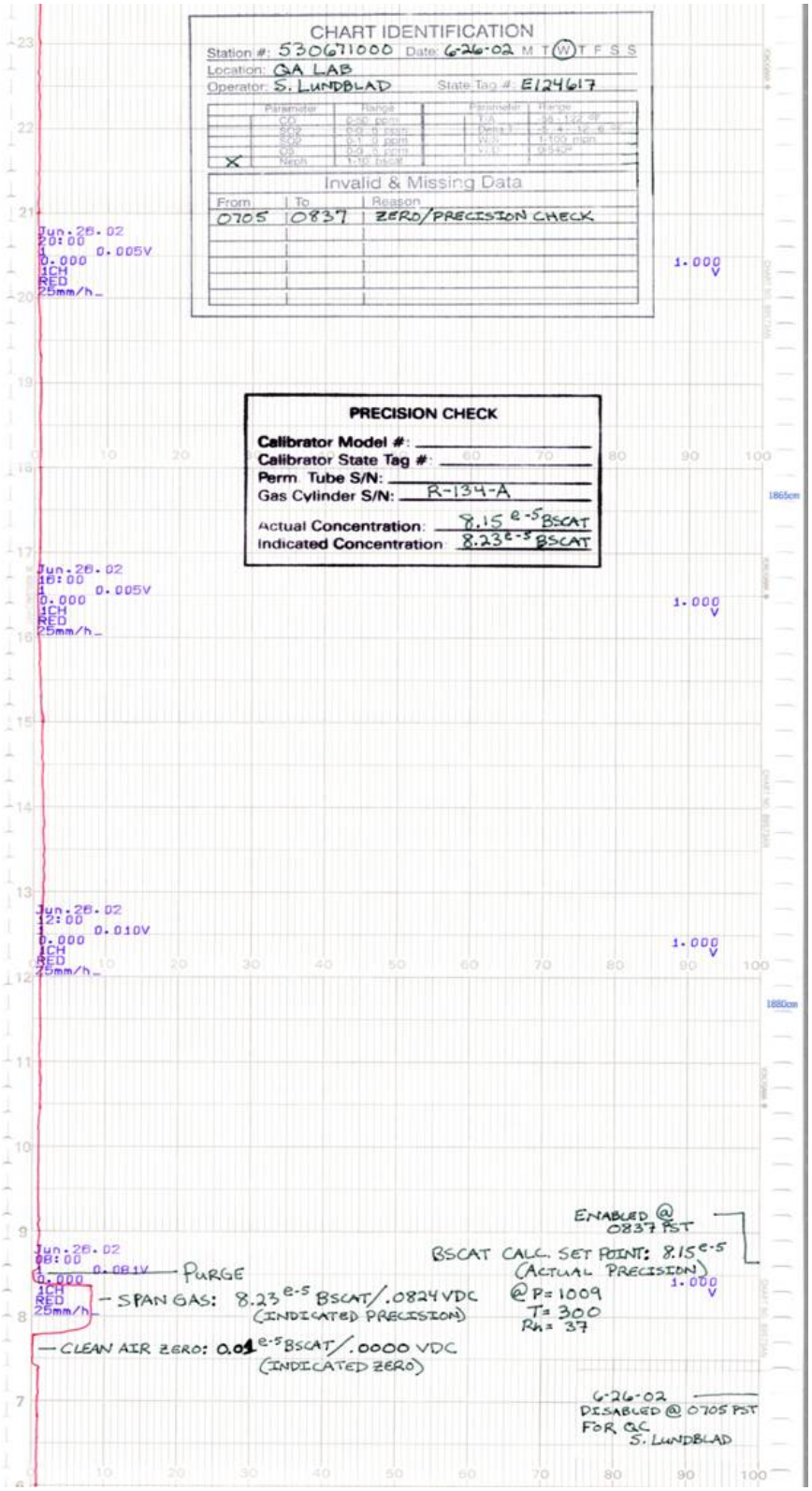
Activities and information that must be documented on the strip chart include, but are not limited to, the following:

- Time checks
- Automated and manual quality control checks
- Equipment problems and/or replacements
- Unusual site conditions and/or events such as power failures
- Explanations for missing or invalid data

3.3 Documenting Log books and Strip Charts

This section details the proper documentation of strip charts. A properly documented nephelometer (BSCAT) chart is presented in figure 3.3 below for reference.

Figure 3.3: Properly Documented Strip Chart



3.3.1 During every site visit

- Using a pen, make a small mark on the far right side of the strip chart indicating the start of the site visit
- Do not write over the pen "trace" of the pollutant
- Record the data logger date and time and initial the chart next to the mark on the strip chart
- Record the day of the week, date, time, and operator name in the log book
- Disable the data logger if conducting maintenance activity or performing a calibration check
- Check the chart time for accuracy using the data logger time. If the chart is off by 10 minutes or more, advance it to the proper time, Pacific Standard Time (PST)
- Do not reverse the strip chart as subsequent readings will overwrite data that is already on the chart
- Check chart paper supply and replenish as necessary
- Replace chart pen(s) and/or plotter if necessary
- Thoroughly document any maintenance activities and calibration check information in the log book
- Briefly summarize maintenance information and calibration readings on the strip chart

3.3.2 Calibration Checks

All automated instruments sampling for criteria pollutants must be checked for proper calibration at a minimum of every 10 days. Calibration checks for these instruments are performed both automatically and manually. Automated calibration checks are initiated by the data logger and are recorded digitally via the telemetry system while manual checks are performed by the station operator. For non-criteria automated instrument calibration check schedules, please refer to the parameter-specific standard operating procedures of this manual.

3.3.2.1 Documenting Manual Calibration Checks

Manual calibration checks for all automated instruments must be performed at a minimum of every 14 days.

Manual calibrations from automated instruments sampling for criteria pollutants are to be documented in the manner described below. All other automated instrument calibration checks should be documented according to the following procedures where applicable. For additional documentation requirements for non-criteria automated instruments please refer to the parameter-specific standard operating procedures of this manual.

- Disable the data logger and record the day of week, the data logger date, time, and operator initials on the chart and in the log book
- Record the instrument state tag or ID number on the chart and in the log book

- Record transfer standard serial numbers or remaining PSI values for calibration gas cylinders on the chart and in the log book
- Record both the indicated and actual values for zero, precision, and span on the chart and in the log book
- Calculate the percent difference using the following equation and record the percentages in the log book:

$$\left(\frac{Indicated - Actual}{Actual}\right) * 100 = \%difference$$

- Using Table 3.1 below, determine the control limits for the appropriate pollutant and take any necessary action. For those not listed, please refer to the parameter-specific standard operating procedure in this manual
- ***Do not make any instrument adjustments until the entire calibration check has been completed***
- Record any corrective action taken and post-adjustment values on the chart and in the log book
- Enable the data logger and record the time it was enabled on the chart and in the log book

3.3.2.2 Documenting Automated Calibration Checks

The following apply to automated calibration checks:

- Automated calibration checks occur on criteria pollutant instruments only
- Site operators do not need to document all automated calibration checks. Automated checks need to be documented on the strip chart only when they are used to determine instrument precision
- Automated checks documented to determine instrument precision should fall mid-way between manual checks. For example, if a manual check is performed on January 1st and the next manual check is on January 14th, an automated check should be documented on or near January 8th. This schedule ensures that the 10 day calibration check requirement is met and that documented checks are temporally distributed
- Automated calibration checks must be documented on the strip chart in the same manner as a manual calibration check
- Operators can access the automated calibration checks via the Ecology Site Operator website: https://fortress.wa.gov/ecy/aqp/Site/
- Complete automated calibration checks (zero, precision, and span) occur at different frequencies depending on the pollutant, while automated zeros occur daily for all pollutants
- Automated calibrations for carbon monoxide (CO) and ozone must be retrieved from the website within 7 days of the calibration. There are separate calibration reports for both CO and ozone on the Site Operator website. NO_2 and SO_2 calibrations must be retrieved on the day on which they occur and can be found on the same website in the Calibration Report
- Operators should examine the results of all automated calibration checks and daily zeros to ensure the instrument is operating properly and is within control limits

Table 3.1: Quality Control Limits

	Corrective Action	BSCAT (nephelometer)	Ozone (O_3)	Carbon Monoxide (CO)	Sulfur Dioxide (SO_2)	Nitrogen Dioxide (NO_2)
Zero	**Instrument Adjustment**	$>\pm.3e^{-5}$	>±1% of full scale			
	Invalidate Data	$>\pm.5e^{-5}$	>±2% of full scale			
Precision	**Instrument Adjustment**	>±7%	>±7%			
	Invalidate Data	>±15	>±10%			
Span	**Instrument Adjustment**	N/A	>±7% (adjust at zero and precision only)			
	Invalidate Data	N/A	>±10%			

3.4 Collecting and Processing Strip Charts

At a minimum, strip charts must be collected and processed monthly, within a few days of the end of the previous calendar month of data collection. Yokogawa strip charts are processed in the following manner (for Leeds & Northup strip chart processing, please refer to the previous version of this document which can be obtained from the Air Toxicology and Quality Assurance Unit):

1) Separate charts by calendar month at the 2400 hour line
2) Place a Chart Identification Stamp, shown in figure 3.3 above and 3.4 below, on the first and last days of the month
3) Place a Chart Identification stamp below the 2400 hour line on every day on which a precision check occurs (including automated precision checks)
4) Fill in all of the applicable fields on each Chart Identification Stamp including:
   - Station name and number
   - Date and day of week
   - Operator name
   - Analyzer/instrument tag number
   - Parameter
   - Missing and/or invalid data and a brief explanation
5) Place a Precision Check stamp, shown in Figure 3.5 below, on any day on which a precision check occurs and fill in the applicable information including:
   - Cylinder or permeation tube identification number
   - Calibrator (transfer standard) tag number
   - Actual and indicated concentrations

6) Compile all strip charts by station, parameter, and chronologically with the first day of the month on top

Figure 3.4: Chart Identification Stamp

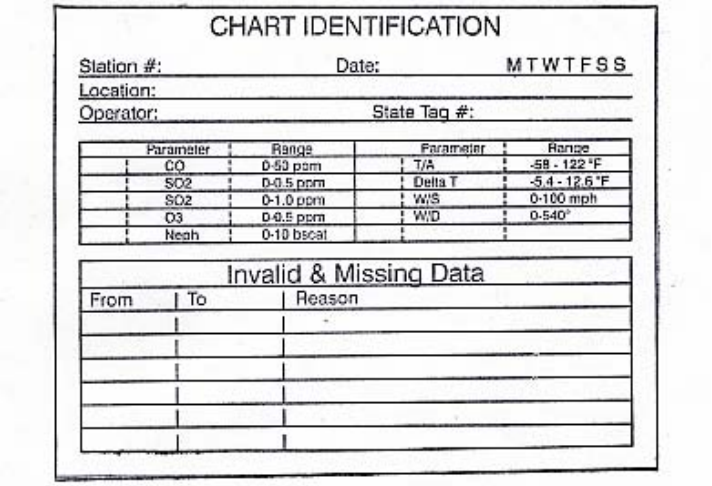


CHART IDENTIFICATION

Station #: Date: M T W T F S S

Location:

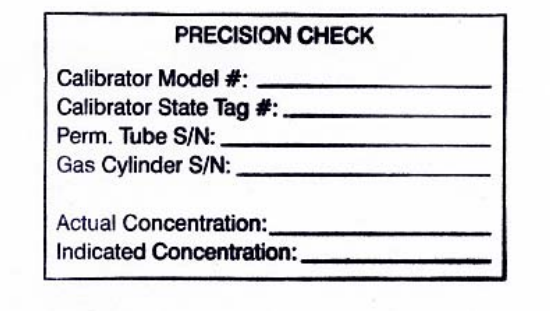
Operator: State Tag #:

Parameter	Range	Parameter	Range
CO	0-50 ppm	T/A	-58 - 122 °F
SO2	0-0.5 ppm	Delta T	-5.4 - 12.6 °F
SO2	0-1.0 ppm	W/S	0-100 mph
O3	0-0.5 ppm	W/D	0-540°
Nesh	0-10 bscat		

Invalid & Missing Data

From	To	Reason

Figure 3.5: Precision Check Stamp


PRECISION CHECK

Calibrator Model #: _____

Calibrator State Tag #: _____

Perm. Tube S/N: _____

Gas Cylinder S/N: _____

Actual Concentration: _____

Indicated Concentration: _____

4 DATA VALIDATION

Thorough data validation ensures that the measurement quality objectives of the Air Quality Program are met and that the data generated during monitoring can be used to make informed attainment determinations and air quality management decisions that affect public and environmental health. In addition, a thorough validation process will detect collection system errors and therefore facilitate subsequent improvements.

Data validation consists of two separate activities: initial data validation and final data validation. Initial data validation is that which is conducted by the station operator during and after data collection but prior to submittal of the data to Quality Assurance personnel for final data validation. Final data validation is a separate, thorough, qualitative and quantitative system and data review conducted by Quality Assurance personnel.

Data that has been through the entire validation process is sent to the Environmental Protection Agency (EPA) via the Air Quality System database. Among other implementations, it may be utilized by EPA to determine attainment status regarding the National Ambient Air Quality Standards (NAAQS) and used in Air Quality Program management decisions and modeling activities. The data is also available to the public and private entities upon request.

Data satisfying the criteria in Section 4.1 below will be considered valid. Data not satisfying these conditions will be invalidated back to the time of the last quality control check that was within the control limits set forth in Table 3.1. Data collected after the point of invalidation will continue to be considered invalid until corrective action has been taken and the data once again meet the criteria below.

4.1 Data Validation Criteria

Data may only be considered valid when the following criteria have been satisfied:

1. The air monitoring instrumentation has been calibrated and operated according to the Program's approved standard operating procedures
2. The data has been properly identified with respect to:
   - Station name
   - Station number
   - Dates and times
   - Operator name
   - Instrument model
   - Instrument identification number
   - Parameter, scale, and units
3. The instrument has been operating within control limits as determined by manual and automated quality control checks during the period of data collection
4. Quality control checks have been performed within the required time limits and have been thoroughly documented
5. The data is free of excessive drift, noise, spiking, and statistical outliers

4.2 Initial Data Validation

The site operator is responsible for ensuring that the collected data has been thoroughly reviewed before submitting it to Quality Assurance for final validation. A thorough review of the data includes, but is not limited to, the following process:

1. Generate a Monthly Running Average Report of the hourly averages from the Site Operator web page (See Figure 4.1 below)
2. For instruments not running in conjunction with a chart recorder skip to step 6
3. Manually reduce several hourly averages of data from the strip chart and compare them to the corresponding hourly averages on the Monthly Running Average Report. A minimum of at least eight hourly averages a month should be compared in this manner. Furthermore, to ensure that the data compare temporally, throughout the range of concentrations, and under different collection conditions,

vary the time of day, day of the week, and week of the month from which the hourly averages are chosen for comparison

4. Valid strip chart data that is missing on the Monthly Running Average Report should be manually reduced from the strip chart and written onto the report in the blank spaces corresponding to the proper time and day. However, if more than three days of consecutive data is missing, the operator should use the Hourly Data Input form (See figure 4.2). Blank Hourly Data Input forms may be found at the end of this document in the Forms section
5. Missing strip chart data resulting from dry ink pens, paper jams, exhausted chart paper, etc., should be noted on the Monthly Running Average Report and strip chart
6. Individual invalid hours of data on the Monthly Running Average Report should be crossed out with "X's" and consecutive hours of invalid data should be lined-through (See Figure 4.1)
7. Missing, questionable, and invalid data and any associated explanations, if known, should be documented on the Monthly Running Average Report and strip chart
8. Determine whether statistical outliers (low or high) exceed relevant NAAQS standards and/or whether instrument malfunction or system errors are involved and take appropriate action
9. Summarize all manual and automated precision checks on the Monthly Precision Check Summary form (See Figure 4.3). Do not report more than one calendar month of precision checks on the form. Blank Monthly Precision Check Summary forms may be found at the end of this document in the Forms section
10. Submit the edited Monthly Running Average Report, Monthly Precision Check Summary form, strip chart, Hourly Data Input form, and all other required documentation to the Air Toxicology and Quality Assurance Unit by the 10th of the month following the end of the calendar month of the data being validated
11. If the submittal deadline cannot be met, please notify the Quality Assurance Coordinator immediately and make alternate arrangements

Figure 4.1: Edited Monthly Running Average Report

Monthly Running Average Report
Run Date: 02/17/04 16:06
(1 Hour Rolling Averages)

SITE NAME: SEABEACH : 53-033-0080 — PARAMETER NAME: CO — MONTH: January
ADDRESS: CHARLESTON ST & 15TH AVE S SEATTLE — PARAMETER CODE: 42101 — YEAR: 2004
LAT/LONG: 047 34' 11" / 122 18' 45" — METHOD: 54 — UNITS: PPM — DECIMAL POSITIONNER: 1
ELEVATION: 91 — PROJECT: 01

Hourly Averages
Beginning Hour (PST)

DA	C	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	AVG	MAX	RDS
01	TH	5	5	5C	4	3	3	3	3	3	3	4	4	3	3	4	4	4	4	4	5	6	6	4	6	0.4	0.6	24
02	FR	4	4	4C	6	5	4	6	5	5	6	7	5	5	6	7	6	8	8	9	7	6	5	5	4	0.6	0.9	24
03	SA	4	4	3C	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0.3	0.4	24
04	SU	3	2	2C	2	2	2	2	2	2	3	3	3	3	3	3	3	4	5	4	4	5	4	4	4	0.3	0.5	24
05	MO	3	3	4C	2C	3	3	4	4	9	4	3	5	3	5	5	5	4	4	3	4	3	3	3	2	0.4	0.9	24
06	TU	3	3	2C	2	2	2	2	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3P	3	0.3	0.3	24
07	WE	3	3	3C	3	3	3	3	3	3	3	4	4	6	6	5	5	6	5	6	5	4	5	4	4	0.4	0.6	24
08	TH	4	4	4C	4	3	3	5	6	6	6	D	7D	7	7	6	8	11	12	18	10	8	8	11	7	0.7	1.8	23
09	FR	9	10	9C	7	7	6	7	11	10	18	16	10	10	10	13	11	9	10	9	15	17	7	4	5	1.0	1.8	24
10	SA	6	6	6C	4	5	5	4	4	4	5	10	7	8	10	9	11	13	13	9	9	8	9	9	9	0.8	1.3	24
11	SU	11	11	12C	12	12	12	14	16	19	15	14	18	15	20	16	14	13	13	15	12	16	12	11	8	1.4	2.0	24
12	MO	7	7	11C	8C	13	8	8	17	17	10	11	10	8	7	7	7	8	8	9	8	5	8	7	5	0.9	1.7	24
13	TU	8	6	7C	9	8	6	0	19	7	17	9	8	10	10	12	14	12	14	12	15	8	14	19	13	1.1	1.9	24
14	WE	8	6	15C	11	8	10	11	7	10	17	9	4	8	9	8	10	10D	7	7	7	6	6	6	6	0.9	1.7	24
15	TH	7	6	4C	4	4	4	5	5	5	5	5	5	5	5	5	6	5	5	6	6	5	5	8	6	0.5	0.8	24
16	FR	6	6	6C	7	6	6	6	9	8	8	7	6	7	6	7	8	8	11	14	14	13	13	13	14	0.9	1.4	24
17	SA	15	16	11C	9	8	10	10	12	24	12	9	8	9	8	6	7	10	13	13	9	7	11	9	7	1.0	1.6	24
18	SU	8	8	8C	8	8	4	4	6	5	6	6	6	6	7	7	7	7	5	5	6	5	6	6	7	0.6	0.8	24
19	MO	6	5	4C	6C	5	6	6	7	6	7	7	7	6	6	10	7	7	9	7	7	6	7	7	6	0.7	1.0	24
20	TU	5	5	5C	5	5	5	5	6	6	7	6	6	6	6	7	9	9	12	9	7	9	11	9	9	0.7	1.2	24
21	WE	9	6	6C	6	6	6	6	6	6	7	6	6	7	10	8	9D	D	14	13	12	10	17	19	17	1.0	1.9	23
22	TH	19	13	10C	10	10	11	11	11	15	15	14	12	11	7	6	7	9	9	9	7	6	5	5	7	1.0	1.9	24
23	FR	5	6	5C	4	4	4	5	6	10	5	10	8	9	8	10	8	9	13	8	7	9	8	9	8	0.8	1.3	24
24	SA	4	5	5C	4	4	4	4	4	5	5	4	4	5	4	4	5	6	6	8	7	5	6	6	6	0.5	0.8	24
25	SU	4	5	5C	4	5	5	5	6	7	6	6	5	5	5	5	6	6	6	5	5	5	5	5	4	0.5	0.8	24
26	MO	5	4	4C	5C	4	4	5	5	6	5	5	5	4	5	5	5	6	6	5	5	5	5	5	4	0.5	0.6	24
27	TU	4	4	4C	4	4	5	5	8	8	8	7	6	5	5	6	6	6	6	6	5	5	5	4	4	0.5	0.8	24
28	WE	4	4	4C	4	4	5	5	6	5	5	5	5	5	5	5	8	7	7	8	7	7	6	6	5	0.5	0.8	24
29	TH	4	5	6C	4	4	4	5	6	8	8	7	7	7	9	D	D	6	5	5	5	5	5	5	5	0.6	0.9	22
30	FR	4P	4	4C	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	0.5	0.5	24
31	SA	5	5	5C	5	5	5	5	6	6	5	6	6	6	5	5	5	5	6	6	5	5	5	5	5	0.5	0.6	24
AVG		6	6	6	6	5	5	6	7	7	8	7	6	6	7	7	7	7	8	8	7	7	7	7	6	0.6		
MAX		19	16	15	12	13	12	14	19	19	18	16	18	15	20	16	14	13	15	18	15	28	17	19	17		2.0	
DAYS		31	31	31	31	31	31	31	31	31	31	30	31	31	31	30	30	30	31	31	31	31	31	31	31			740

STANDARD DEVIATION 2.0

NOTES: 1/21-29 FAILED Q.C.

NOTES: *** INDICATE INVALID DATA OR LESS THAN 75 PERCENT VALID DATA INCLUDED.
STATUS CODES 'P' - POWER DOWN, 'D' - DISABLED, 'B' - BAD STATUS, 'C' - CALIBRATION, '-' MINIMUM, '+' - MAXIMUM,
'R' - RATE OF CHANGE, 'E' - FIELD EXCEEDED, 'N' - DATA NOT FOUND, 'A' - CALIBRATION OUT OF TOLERANCE, ' ' - NO ERROR

Figure 4.2: Completed Hourly Data Input Form

Hourly Data Input

AIRS Number: 530330080 **Parameter:** CO

Site Name: Seattle, Beacon Hill **Decimal Position:** 1 **Units:** ppm

Month: January **Year:** 2004

Enter Data in cells as whole numbers

Day	St. Hr.	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	Day	St. Hr.	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
1	00													1	12												
2	00													2	12												
3	00													3	12												
4	00													4	12												
5	00		24	25C	26C	30	75	83	102	54	45	40	35	5	12	24	23	23	24	32	66	78	56	44	22	11	9
6	00	7	3	4C	5	3	23	27	35	23	11	7	5	6	12	3	0	0	1	1	23	34	23	11	3	4	3
7	00	4	4	5C	21	23	40	56	57	44	32	33	31	7	12	29	27	25	25	30	50	52	45	33	21	11	9
8	00	9	6	3C	11	12	14	45	56					8	12												
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Figure 4.3: Completed Monthly Precision Check Summary Form

Monthly Precision Check Summary

AIRS NUMBER: 530330080

PARAMETER: Carbon Monoxide **YEAR:** 2004 **MONTH:** February

STATE TAG OR ID #: E118810

LOCATION: Seattle, Beacon Hill **OPERATOR:** Jim Frost

DATE			ACTUAL CONC.	INDICATED CONC.	UNITS	*PASSED?	COMMENTS
Month	Day	Year				Y or N	
2	5	2004	9.89	10.01	ppm	**Y**	Manual Check
2	11	2004	9.89	10.20	ppm	**Y**	Automated Check
2	18	2004	9.89	10.31	ppm	**Y**	Manual Check
2	25	2004	9.89	9.91	ppm	**Y**	Automated Check

*Shaded area to be completed by QA Personnel

PRECISION CHECK EQUIPMENT:

Gas Cylinder Serial #: CA15150

Calibrator Model:

Calibrator Serial #:

Permeation Tube #:

Decimal Placement:	
CO	**2**
SO2	**3**
NO2	**3**
O3	**3**
NEPH	**3**

COMMENTS:

4.3 Final Data Validation

Final data validation is conducted by Quality Assurance personnel. It must be an independent, thorough review of the data. Therefore, Quality Assurance personnel must not be involved in the collection of data or initial data validation.

4.3.1 Final Data Validation Procedures

Quality Assurance personnel will conduct a qualitative and quantitative thorough review of the data that will include, but is not limited to, the following activities:

1. Obtain Monthly Running Average Reports from the Monitoring Unit
2. Review strip charts (when utilized) and all associated calibration check paperwork for the following:

    - **Completeness of data** – contact operator regarding unaccounted-for missing information and data
    - **Documentation** – ensure all forms, strip charts, etc., are properly and thoroughly documented
    - **Quality control activities** – ensure all required precision checks are within control limits
    - **Proper operation and maintenance of instrument** – verify that all maintenance activities have been completed
    - **Comparability** – verify a minimum of 1 hourly average every 3 days
    - **Telemetry flags** – determine validity of flagged data
    - **Statistical outliers (low or high)** – determine whether data exceeds relevant NAAQS standards and/or whether instrument malfunction or system errors are involved and take appropriate action
    - **Compare data to other parameters** – as necessary, determine validity of data by examining relationship to other parameters

3. Make necessary edits on the Monthly Running Average Reports
4. Compile the charts and archive according to date
5. Return edited Monthly Running Average Reports to Monitoring Unit for telemetry data editing
6. Obtain final Monthly Running Average Reports from Monitoring Unit and ensure all edits were completed as directed and, in the case of errors, notify Monitoring Unit for correction
7. When all data is completely and accurately edited, notify the Monitoring Unit that the data is valid and ready for submittal to EPA

5 REFERENCES

1) "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume I - Principles." EPA-600/9-76-005. December, 1984.

2) "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II - Ambient Air Specific Methods." EPA-600/4-77-027a. January, 1983.

3) Code of Federal Regulations, Title 40, Part 58 (40 CFR 58).

4) "State of Washington Department of Ecology, Air Quality Program, Automated Method Data Documentation and Validation Procedures."
December 1993.

9 FORMS

- Precision Check Summary
- Hourly Data Input

Monthly Precision Check Summary

AIRS NUMBER: _____

PARAMETER: _____ **YEAR:** _____ **MONTH:** _____

STATE TAG OR ID #: _____

LOCATION: _____ **OPERATOR:** _____

DATE			ACTUAL CONC.	INDICATED CONC.	UNITS	*PASSED?	COMMENTS
Month	Day	Year				Y or N	

*Shaded area to be completed by QA Personnel

PRECISION CHECK EQUIPMENT:

Gas Cylinder Serial #: _____

Calibrator Model: _____

Calibrator Serial #: _____

Permeation Tube #: _____

Decimal Placement:	
CO	2
SO2	3
NO2	3
O3	3
NEPH	3

COMMENTS:

Hourly Data Input

AIRS Number: _____ **Parameter:** _____

Site Name: _____ **Decimal Position:** _____ **Units:** _____

Month: _____ **Year:** _____

Enter Data in cells as whole numbers

Day	St. Hr.	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12
1	00												
2	00												
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Day	St. Hr.	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
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